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(54) **Scroll-type fluid compressor unit.**

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Scroll-type fluid compressor unit

This invention relates to scroll type fluid compressor units.

A scroll type apparatus is well known in the prior art as disclosed in, for example, U.S. Patent No. 801,182, and others, which comprises two scroll members each having an end plate and a spiroidal or involute spiral element. These scroll members are so maintained angularly and radially offset that their spiral elements interfit to make a plurality of line contacts between their spiral curved surfaces, thereby to seal off and define at least one fluid pocket. The relative orbital motion of these scroll members shifts the line contacts along the spiral curved surfaces and, therefore, the fluid pocket changes in volume. The volume of the fluid pocket increases or decreases in dependence on the direction of the orbital motion. Therefore, a scroll type apparatus is suitable for handling fluids or for compressing, expanding or pumping them.

In comparison with a conventional compressor of the piston type, a scroll type compressor has some advantages such as less number of parts, continuous compression of fluid and others. But, there have been several problems; primarily sealing of the fluid pocket, wearing of the spiral elements, and inlet and outlet porting.

Although there have been many patents, for example, U.S. Patent Nos. 3,884,599, 3,924,977, 3,994,633, 3,994,635 3,994,636 and 4,065,279 in order to resolve those and other problems, the resultant compressor is complicated in construction and in production.

It is desirable that the fluid introduced into the compressor housing should be reliably and sufficiently taken into all fluid pockets between the scroll members, in order to effectively compress the fluid. In the above-mentioned U.S. patent No. 3,994,636, for example, the fluid to be compressed is introduced into peripheral fluid pockets via oppositely disposed inlet ports in the compressor housing. The feed of fluid to the pockets is therefore complicated.

Furthermore, in order to increase the compressive capacity and compression ratio, it is desirable to increase the number of turns of each spiral element. This means that the radius of the compressor housing is increased. In French specification No. 2,232,674, for example, each scroll member is provided with two spiral elements and there is a single inlet port in an end plate of the fixed scroll member, fluid from the single inlet port flowing to all fluid pockets via the space outside the spiral elements of the scroll member. Since there is a relatively large spacing between the peripheral parts of the spiral elements and the housing, there is a large volume into which the fluid can expand before moving into the fluid pockets.

Finally, the compressor unit of the scroll type should be provided with a lubricating system for lubricating the moving parts.

According to the present invention there is provided a scroll type compressor unit including a compressor housing having a fluid inlet port and a fluid outlet port, a fixed scroll member fixedly disposed within said compressor housing and having first end plate means to which first wrap means are affixed, said first end plate means being formed with a first hole at a position adjacent to the center of said first wrap means, said first hole being connected to said outlet port, a first chamber defined by the inner surface of said compressor housing and said first end plate means of said fixed scroll member and containing said first wrap means therein, and an orbiting scroll member orbitally disposed within said first chamber and having second end plate means to which second wrap means are affixed, said first and second wrap means, interfitting, being angularly offset by an angle equal or substantially equal to 180°, and having a plurality of line contacts so as to define at least one sealed off fluid pocket which moves with a reduction in volume thereof upon orbital motion of said orbiting scroll member, thereby to compress the fluid in the pocket, the compressed fluid being discharged via said first hole and said outlet port, characterised in that a second hole is formed in said first end plate means outside said first wrap means and at a position adjacent to an outer terminal end of said second wrap means, said second hole is connected with said fluid inlet port to thereby introduce fluid from said inlet port into said first chamber, first means are provided for closing a gap between the outer peripheral end of said second end plate means and the inner surface of said compressor housing but permitting the orbital motion of said orbiting scroll member, whereby the fluid introduced through said second hole is confined in the space between said first and second end plate means, a part of the fluid is taken into a first space between said outer terminal end portion of said second wrap means and the adjacent first wrap means to be compressed and the other part of the fluid is guided along said second wrap means into another space between the outer terminal end portion of said first wrap means and the adjacent second wrap means to be compressed, said first wrap means so extends on said first end plate means that its outer terminal end engages with the inner surface of said compressor housing, said second wrap means extends over the same number of turns as said first wrap means, and said other part of the fluid is compressed by the orbital motion of said orbiting scroll member whilst being guided along said second wrap means into said another space.

The compressor unit forming the subject of

the present invention is in many respects similar to that disclosed in EP—A—0012614 falling within the terms of Article 54, paragraph 3 of the EPC.

One embodiment of the invention is a scroll type compressor unit wherein fluid introduced into its compressor housing is effectively taken into all fluid pockets between the scroll members. The interior of its compressor housing is so arranged for the compression of the fluid that the compressive capacity is increased without increasing the volume of the housing. The unit has an improved lubricating system.

In this embodiment, the compressor housing has a fluid inlet port and fluid outlet port. A fixed scroll member, having first end plate means to which first wrap means are affixed, is fixedly disposed in the compressor housing so that a chamber is defined by the inner surface of the compressor housing and the first end plate means of the fixed scroll member. The first wrap means are disposed in the chamber. An orbiting scroll member having second end plate means and second wrap means affixed thereon is orbitally disposed within the chamber in such a fashion that the second wrap means and first wrap means interfit, are angularly offset by an angle equal or substantially equal to 180°, and have a plurality of line contacts so as to define at least one pair of sealed off fluid pockets. Each fluid pocket moves and is reduced in volume upon orbital motion of the orbiting scroll member, thereby to compress the fluid in the pocket. The first end plate means are provided with a first hole outside the first wrap means and at an adjacent position to the outer terminal end of the second wrap means and with second hole at a position adjacent to the center of the first wrap means. The first hole is connected to the fluid inlet port, thereby to introduce the fluid from the inlet port into the chamber. A part of the fluid is taken into a space between the outer terminal end portion of the second wrap means and the adjacent first wrap means and is compressed. The other part of the fluid is guided along the second wrap means into another space between the outer terminal end portion of the first wrap means and the adjacent second wrap means and is compressed. The second hole is connected with the fluid outlet port so that the compressed fluid is discharged from the second hole and the outlet port.

First means for closing a gap between the outer peripheral end of the second end plate means and the inner surface of the compressor housing, whilst permitting orbital motion of the orbiting scroll member, are provided within the compressor housing, whereby fluid introduced through the first hole is confined in the space between the first and second end plate means.

The first wrap means is so arranged on the first end plate means that its outer terminal end engages with the inner surface of the compressor housing. The second wrap means extends over the same number of turns as the first wrap means. Fluid introduced through the first hole of the first end plate means is partially guided into the space between the outer terminal end portion and the adjacent second wrap means, along the outer surface of the outer terminal end portion of the second wrap means, and is compressed.

The compressor housing of this embodiment includes a rear end plate which is provided with a suction chamber and a discharge chamber. The rear end plate is provided with the fluid inlet port, which is connected with the suction chamber, and the outlet port, which is connected with the discharge chamber. These suction and discharge chambers are disposed on the side of the first end plate means of the fixed scroll member opposite to the above-mentioned chamber within the interior of the compressor housing which contains the scroll members, and they are connected to the first and second holes, respectively. The fixed scroll member is oriented so that the first hole is disposed at an upper location in the compressor housing. In the suction chamber, an oil separator plate is arranged to prevent oil from flowing into the first hole of the first end plate means. Accordingly, the fluid strikes the oil separator plate before flowing into the first hole and is separated from oil mixed therein. The separated oil is accumulated in a lower portion of the suction chamber, and passes therefrom to the chamber defined in the compressor housing through an oil passageway. Thus, the oil which is sent out into the fluid circulating circuit together with the compressed fluid, is separated in the suction chamber and returns into the chamber to be used for lubricating moving parts in the compressor housing.

The invention will now be described, by way of example, with reference to the accompanying drawings, in which:—

Figs. 1a—1d are views for illustrating the principle of the operation of the scroll type compressor;

Fig. 2 is a vertical sectional view of a compressor unit;

Fig. 3 is a perspective view of a rotor in the compressor of Fig. 2;

Fig. 4 is a disassembled perspective view of a rotation preventing mechanism in the compressor of Fig. 2;

Fig. 5 is a perspective view of a fixed scroll member in the compressor of Fig. 2;

Fig. 6 is a front view of the fixed scroll member;

Figs. 7a—7d are views of the compressor of Fig. 2 and similar to Figs. 1a—1d;

Fig. 8 is a vertical sectional view of a compressor unit in accordance with this invention;

Fig. 9 is a perspective view of a rotation preventing mechanism in a modified embodiment;

Fig. 10 is a perspective view of rear end plate in Fig. 2; and

Fig. 11 is a perspective view of the fixed scroll member and the rear end plate, with an oil separator plate and check valve means being disassembled.

Before preferred embodiments of this invention are described, the principle of the operation of the scroll type compressor unit is firstly described referring to Figs. 1a—1d.

When two spiral elements or wrap means 1 and 2 are angularly offset and disposed interfitting to one another, spaces or fluid pockets 3 (dotted regions) which are defined by contact portions of both spiral elements are formed between both spiral elements, as shown in the figures. When spiral element 1 is now so moved in relation to the other spiral element 2 that the center *O'* of spiral element 1 revolves around the center *O* of spiral element 2 with a radius of O—O' while preventing the rotation of spiral element 1, fluid pockets 3 shift angularly and radially towards the center of interfitted spiral elements with the volume of each fluid pocket 3 being gradually reduced, as shown in Figs. 1a—1d. Therefore, the fluid in each pocket is compressed.

In the status of revolution of 360° angle as shown in Fig. 1a, both pockets 3 are disposed at a central portion and connected to one another to form a single pocket, and the volume of the connected single pocket is further reduced by further revolution of every 90° angle as shown in Figs. 1b, 1c and 1d, and is substantially zero in the status of Fig. 1d. In the course of rotation, outer spaces which open in the status of Fig. 1b change as shown in Figs. 1c, 1d and 1a, to form new sealed off pockets in which fluid is newly enclosed.

Accordingly, if circular plates are disposed at, and sealed to, axial opposite ends of spiral elements 1 and 2, respectively, and if one of the circular plates is provided with a discharge port 4 at the center thereof as shown in the figures, fluid is taken into fluid pockets at the radial outer portion and is discharged from the discharge port 4 after being compressed.

As will be understood from the above description, fluid pockets are periodically and newly formed at outer terminal end portions of respective spiral elements, by the relative orbital motion of spiral elements. Therefore, in order to obtain an effective compression, the fluid must be fed to the outer terminal end portions of respective spiral elements so that all fluid pockets may be used for fluid compression.

Since outer terminal end portions of respective spiral elements are disposed at positions which are angularly offset from one another by an angle of about 180°, the feed of fluid to respective outer terminal ends of spiral elements can be difficult and complicated in construction.

Briefly stated, an aspect of this invention attempts to introduce fluid in a chamber, in which scroll members are disposed, at a position adjacent to the outer terminal end of the spiral element of the orbiting scroll member and to guide a part of the introduced fluid along the outer surface of the spiral element of the orbiting scroll member to the outer terminal end portion of the spiral element of the fixed orbiting scroll member.

Referring to Fig. 2, a refrigerant compressor unit 10 includes a compressor housing comprising a front end plate 11, a rear end plate 12 and a cylindrical body 13 connecting between those end plates. Front end plate 11 is shown formed integral with cylindrical body 13. The compressor housing defines a sealed off chamber therein which communicates outside the compressor housing through a fluid inlet port 124 and a fluid outlet port (125, in Fig. 10) formed in rear end plate 12. A drive shaft 15 is rotatably supported by a radial needle bearing 14 in front end plate 11. Front end plate 11 has a sleeve portion 16 projecting on the front surface thereof and surrounding drive shaft 15 to define a shaft seal cavity 18. Within shaft seal cavity 18, a shaft seal assembly 17 is assembled on drive shaft 15. Drive shaft 15 is driven by an external drive power source (not shown) through a rotational force transmitting means such as a pulley connected with drive shaft 15 and belt means connecting between the pulley and the external drive power source. A disk rotor 20 is fixedly mounted on an inner end of drive shaft 15 and is borne on the inner surface of front end plate 11 through a thrust needle bearing 21 which is disposed concentric with drive shaft 15. Rotor 20 is formed integral with drive shaft 15 in the shown embodiment. Rotor 20 is provided with a balance weight 20a and balance hole 20b to compensate the dynamic unbalance as shown in Fig. 3. Disk rotor 20 is also provided with a drive pin 22 projecting on the rear end surface thereof. Drive pin 22 is radially offset from drive shaft 15 by a predetermined distance.

Reference numerals 23 and 24 represent a pair of interfitting orbiting and fixed scroll members. Orbiting scroll member 23 includes an end circular plate 231 and a wrap means or spiral element 232 affixed onto one end surface of circular plate 231. Circular plate 231 is provided with a boss 233 projecting on the other end surface thereof. Drive pin 22 is fitted into boss 233 with a bush 25 and a radial needle bearing 26 therebetween, so that orbiting scroll member 23 is rotatably supported on drive pin 22.

A hollow member 27 having a radial flange 271 is fitted onto boss 233 non-rotatably by means of key and keyway connection. Radial flange 271 is supported on the rear end surface of disk rotor 20 by a thrust needle bearing 28 which is disposed concentric with drive pin 22. The axial length of hollow member 27 is equal to, or more than, the axial length of boss 233, so that the thrust load from orbiting scroll member 23 is supported on front end plate 11 through disk rotor 20. Therefore, the rotation of

drive shaft 15 effects the orbital motion of orbiting scroll member 23 together with hollow member 27. Thus, orbiting scroll member 23 moves along a circle of a radius of the distance between drive shaft 15 and drive pin 22.

Means 29 for preventing orbiting scroll member 23 from rotating during its orbital motion is disposed between circular plate 231 of orbiting scroll member 23 and radial flange 271 of hollow member 27.

Referring to Figs. 2 and 4, rotation preventing means 29 will be described. Orbiting scroll member 23 is provided with a pair of keyways 234a and 234b on the front end surface of circular plate 231 which are formed at both sides of boss 233 along a diameter. An Oldham ring 30 is disposed around a cylindrical portion 272 of hollow member 27. Oldham ring 30 is provided with a first pair of keys 30a and 30b on the surface opposite to the front end surface of circular plate 231, which are received in keyways 234a and 234b. Oldham ring 30 is also provided with a second pair of keys 30c and 30d on its opposite surface. Keys 30c and 30d are arranged along a diameter perpendicular to the diameter along which keys 30a and 30b are arranged. An annular plate 31 is disposed around cylindrical portion 272 of hollow member 27 and between radial flange 271 and Oldham ring 30, and is non-rotatably secured to the inner surface of cylindrical body 13 by key means 32. Annular plate 31 is provided with a pair of keyways 31a and 31b on the surface opposite to Oldham ring 30 for receiving keys 30c and 30d. Therefore, Oldham ring 30 is slidable in a radial direction by the guide of keys 30c and 30d by keyways 31a and 31b but is prevented from rotation. And orbiting scroll member 23 is slidable in the other radial direction by the guide of keys 30a and 30b by keyways 234a and 234b, but is prevented from rotation. Accordingly, orbiting scroll member 23 is prevented from rotation, but is permitted to move in two radial directions perpendicular to one another. Therefore, since orbiting scroll member 23 is permitted to move along a circular orbit as a result of movement in the two radial directions but is prevented from rotation, it effects the orbital motion without rotation by the eccentric movement of drive pin 22 by the rotation of drive shaft 15.

The other fixed scroll member 24 also comprises an end circular plate 241 and a wrap means or spiral element 242 affixed on one end surface of the circular plate. Circular plate 241 is provided with a hole 243 formed at a position corresponding to the center of spiral element 242. Hole 243 corresponds to discharge port 4 in Fig. 1a.

Circular plate 241 is interposed between rear end plate 12 and cylindrical portion 13, and is secured thereto by bolt means 33, with an orientation that the outer terminal end of spiral element 242 is disposed on a lower side.

Referring to Fig. 10 as well as Fig. 2, rear end plate 12 is provided with an annular projection 121 on its inner surface to partition a suction chamber 122 and a discharge chamber 123. The axial projecting end surface of annular projection 121 is in tight contact with the rear end surface of circular plate 241 of fixed scroll member 24 around discharged port 243, so that discharge port 243 connects with discharge chamber 123. Within discharge chamber 123, a check valve 34 is disposed to close discharge port 243. Check valve 34 is illustrated in Fig. 11 in a disassembled condition. Suction chamber 122 and discharge chamber 123 are connected to inlet port 124 and the outlet port 125, respectively.

Referring to Figs. 5 and 6 in addition to Fig. 2, circular plate 241 is also provided with another hole 244 at a position outside spiral element 242 and on a side opposite to the outer terminal end of spiral element 242 in reference to center hole 243. Therefore, hole 244 is disposed on an upper side and adjacent to the outer terminal end of spiral element 232 of orbiting scroll member 23. Accordingly, a chamber 131 defined within the interior of compressor housing by circular end plate 241 is connected with suction chamber 122 through hole 244. Hole 244 is shown crescent-shaped.

In the above described compressor, when drive shaft 15 is rotated by an external drive power source (not shown), drive pin 22 moves eccentrically to effect the orbital motion of orbiting scroll member 23. At this time, since the rotation of orbiting scroll member 23 is prevented by rotation preventing means 29, the motion of orbiting scroll member 23 in relation to fixed scroll member 24 is similar to that as shown in Figs. 1a—1d. Therefore, the fluid or refrigerant gas introduced into chamber 131 through inlet port 124, suction chamber 122 and hole 244 is taken into fluid pockets (3, in Figs. 1a—1d) between both scroll members 23 and 24, and is compressed by the orbital motion of orbiting scroll member 23. The compressed fluid is discharged into discharge chamber 123 through hole 243, and, therefrom, discharged through the outlet port to, for example, a cooling circuit. The fluid subsequently returns into chamber 131 through inlet port 124, suction chamber 122 and hole 244.

A part of the fluid introduced into chamber 131 through hole 244 flows into a space between the outer terminal end of spiral element 232 and the adjacent side surface of spiral element 242, because hole 244 is disposed adjacent to the outer terminal end of spiral element 232. And the fluid is taken into a fluid pocket which is formed by the orbital motion of orbiting scroll member 23, and is compressed by further motion of orbiting scroll member 23. The operation will be easily understood by referring to Figs. 7a—7d.

The other part of the fluid flows between the outer terminal end portion of spiral element 232 and the inner surface (13a in Fig. 7b) of

cylindrical body 13 to the outer terminal end portion of spiral element 242 of fixed scroll member 24 by the motion of orbiting scroll member 23. The fluid flows into a space between the outer terminal end portion of spiral element 242 and the adjacent surface of spiral element 232, and is taken into another pocket which is formed by the orbital motion of orbiting scroll member 23. Thereafter, the fluid is compressed by further motion of orbiting scroll member 23. The operation will be also understood by referring to Figs. 1a—1d.

As will be understood from the above description, if hole 244 is formed at the position outside spiral element 242 of fixed scroll member 24 and adjacent to the outer terminal end of spiral element 232 of orbiting scroll member 23, the fluid introduced through hole 244 is not only directly taken into the space between the outer terminal end of spiral element 232 and the adjacent spiral element 242, but also sent to the space between the outer terminal end of spiral element 242 and the adjacent spiral element 232, so that the introduced fluid is securely taken into all fluid pockets. It will be understood that the fluid can be also fed to the space between the outer terminal end of spiral element 242 and the adjacent spiral element 232 along the outer side of spiral element 232, even if spiral element 242 is extended so that its outer terminal end engages with the inner surface of cylindrical body 13, as shown in Figs. 5—7d. Accordingly, compressive ratio can be increased by extending spiral element 232 correspondingly to the extension of spiral element 242 without any increase of the diameter of cylindrical body 13 of the compressor housing.

Furthermore, when spiral element 242 is so formed that its outer terminal end engages with the inner surface of cylindrical body 13, the fluid portion which is sent to the space between the outer terminal end of spiral element 242 and the adjacent outer surface of spiral element 232, is pre-compressed during flowing along the outer surface of spiral element 232. That is, the fluid which flows into the gap between the inner surface 13a of cylindrical body 13 and the outer surface of spiral element 232 at a status shown in Fig. 7b, is confined in the closed space 3′ which is formed by inner surface 13a, the outer surface of spiral element 232 and the inner surface of spiral element 242 after orbiting scroll member 23 is moved into the state shown in Fig. 7d via the state shown in Fig. 7c.

The pre-compression can be enhanced by forming the outer contour of spiral element 232 at a portion from its outer terminal end to a position to be contacted with the outer terminal end of spiral element 242 in an arcuate curve having a radius *R* equal to the length from its spiral center *O′* to the outer edge of its outer terminal end as shown in Figs. 7a—7d, in comparison with spiral element 242 being formed in a uniform spiral curve over the entire extension.

Referring to Fig. 2 again, there is maintained a gap between the peripheral surface of circular plate 231 of orbiting scroll member 23 and the inner surface of cylindrical body 13, in order to permit orbiting scroll member 23 to effect the orbital motion. Therefore, the fluid in the space between the outer surface of spiral element 232 and the inner surface (13a, in Fig. 7b) of cylindrical body 13 flows out of the space towards spaces between parts of rotation preventing means 29 by the reduction of the space due to the orbital motion of orbiting scroll member 23, so that the pre-compression is not so sufficiently obtained.

In order to secure the pre-compression, means are provided to close the gap between the peripheral surface of circular plate 231 of orbiting scroll member 23 and the inner surface of cylindrical body 13.

Referring to Fig. 8, a ring plate 35 is disposed non-rotatably by key and keyway connection within cylindrical body 13 to be in contact with the front surface of circular plate 231 of orbiting scroll member 23. Ring plate 35 has an outer diameter equal to the inner diameter of cylindrical body 13 and has an inner diameter shorter than the diameter of circular plate 231 of orbiting scroll member 23 to always close the gap between the peripheral end of circular plate 231 and the inner surface of cylindrical body 13 during the orbital motion of orbiting scroll member 23. If the inner diameter of ring plate 35 is shorter than the outer diameter of Oldham ring 30, ring plate 35 is disposed between Oldham ring 30 and circular plate 231. And ring plate 35 must be partially cut away for permitting a pair of keys 30a and 30b to be received in keyways 234a and 234b of circular plate 231 and to be movable in a radial direction due to the guide of another pair of keys 30c and 30d received in keyways 31a and 31b.

The center hole of ring plate 35 need not be a circular hole, but may be an oval hole or in other shape.

The other parts of the embodiment in Fig. 8 are similar to those of the compressor of Figs. 2—7d. Therefore, those parts are represented by the same reference numerals as in Fig. 2, and detailed description of those parts is omitted for the purpose of simplification of the description.

Fig. 9 shows a modification of the embodiment shown in Fig. 8, the modification is characterised by the ring plate being formed integral with the annular plate, as shown in the drawing. That is, an annular member 31′ comprises an annular plate portion 311′, a ring plate portion 35′ and a cylindrical side wall portion 312′ connecting between annular plate portion 311′ and ring plate portion 35′ at their entire peripheral ends. Annular plate portion 311′ is provided with keyways 31′a and 31′b in

the axial inner end surface for receiving keys 30c and 30d of Oldham ring 30. Oldham ring 30 is disposed in a hollow space between annular plate portion 311' and ring plate portion 35'. Ring plate portion 35' is provided with cut away portions 35'a and 35'b for permitting keys 30a and 30b of Oldham ring 30 to be received in keyways (234a and 234b in Fig. 8) of circular plate 231 of orbiting scroll member 23 and to move in a radial direction.

Referring to Fig. 2, lubricating oil is contained in the lower portion of chamber 131 which is defined by front end plate 11, cylindrical body 13 and circular plate 241 of fixed scroll member 24. During the operation, the oil is splashed by disk rotor 20 and agitated by other moving parts, so that oil adheres onto moving parts and they are lubricated.

A part of the oil is taken into fluid pockets and discharged together with the compressed fluid from hole 243 and outlet port 125 to an external circuit.

Referring to Figs. 10 and 11 in addition to Fig. 2, an oil separator plate 36 is stationarily disposed within suction chamber 122 to interrupt the oil flow into hole 244. Oil separator plate 36 is made of a perforated plate and is fixed to circular plate 241 by screw means 37, as shown in Fig. 11.

The fluid, or refrigerant gas which is introduced into suction chamber 122 through inlet port 124 strikes oil separator plate 36 before flowing into hole 244, so that the lubricating oil mixed in the refrigerant gas adheres onto oil separator plate 36 and is separated from the refrigerant gas. The separated oil drops and is accumulated in the lower portion of suction chamber 122.

An oil passageway 38 is formed to extend through circular plate 241, walls of cylindrical body 13 and front end plate 11 to connect between the lower portion of suction chamber 122 and shaft seal cavity 18. Therefore, the oil accumulated in the lower portion of suction chamber 122 flows into shaft seal cavity 18 through oil passageway 38 to lubricate shaft seal assembly 17. A part of the oil flows, therefrom, through bearing 14 into a gap between disk rotor 20 and front end plate 11 and returns to chamber 131 after lubricating thrust bearing 21.

Another oil passageway 39 is formed through drive shaft 15 and disk rotor 20 to connect between shaft seal cavity 18 and a depression 221 formed in drive pin 22. Accordingly, the other part of the oil in shaft seal cavity 18 flows into depression 221 through oil passageway 39 and returns to chamber 131 lubricating radial bearing 26 and thrust bearing 28.

Radial oil passageways 40a and 40b are formed through boss 233 and hollow member 27 to feed the oil from depression 221 to rotation preventing means 29. Thus, keys 30a—30d of Oldham ring 30 and keyways 234a, 234b, 31a and 31b are lubricated.

In order to prevent the refrigerant gas introduced into suction chamber 122 through inlet port 124 from agitating the oil accumulated in the lower portion of suction chamber 122, rear end plate 12 is provided with shield plate portions 126 in suction chamber 122, as shown in Fig. 10. In the arrangement shown, two pairs of plate portions 126a—126b and 126c—126d are formed to radially extend inclined from partitioning annular projection 121 in opposite directions, and another two pairs of plate portions 126e—126f and 126g—126h are formed to radially extend inclined from the inner side surface of rear end plate 12 at opposite positions so that a pair of plate portions 126a—126b engages with another pair of plate portions 126e—126f, with another pair of plate portions 126c—126d engaging with the other pair of plate portions 126g—126h. Accordingly, the introduced fluid is prevented from blowing into the lower portion under shield plate portions 126a—126h so that the accumulated oil therein is not agitated; while the separated oil by oil separator plate 36 drops onto shield plate portions 126a—126h and flows down along them into the lower portion of suction chamber 122.

This invention has been described in detail in connection with preferred embodiments, but these are merely for example only and this invention is not restricted thereto. It will be easily understood by those skilled in the art that other variations and modifications can be easily made within the scope of this invention as defined by the appended claims.

Claims

1. A scroll type compressor unit including a compressor housing having a fluid inlet port (124) and a fluid outlet port (125), a fixed scroll member (24) fixedly disposed within said compressor housing and having first end plate means (241) to which first wrap means (242) are affixed, said first end plate means (241) being formed with a first hole (243) at a position adjacent to the center of said first wrap means (242), said first hole (243) being connected to said outlet port (125), a first chamber (131) defined by the inner surface of said compressor housing and said first end plate means (241) of said fixed scroll member (24) and containing said first wrap means (242) therein, and an orbiting scroll member (23) orbitally disposed within said first chamber (131) and having second end plate means (231) to which second wrap means (232) are affixed, said first and second wrap means (242) and (232), respectively, interfitting, being angularly offset by an angle equal or substantially equal to 180°, and having a plurality of line contacts so as to define at least one sealed off fluid pocket which moves with a reduction in volume thereof

upon orbital motion of said orbiting scroll member (23), thereby to compress the fluid in the pocket, the compressed fluid being discharged via said first hole (243) and said outlet port (125), characterised in that a second hole (244) is formed in said first end plate means (241) outside said first wrap means (242) and at a position adjacent to an outer terminal end of said second wrap means (232), said second hole (244) is connected with said fluid inlet port (124) to thereby introduce fluid from said inlet port into said first chamber (131), first means (35) are provided for closing a gap between the outer peripheral end of said second end plate means (231) and the inner surface of said compressor housing but permitting the orbital motion of said orbiting scroll member (23), whereby the fluid introduced through said second hole (244) is confined in the space between said first and second end plate means (241) and (231), respectively, a part of the fluid is taken into a first space between said outer terminal end portion of said second wrap means (232) and the adjacent first wrap means (242) to be compressed and the other part of the fluid is guided along said second wrap means (232) into another space between the outer terminal end portion of said first wrap means (242) and the adjacent second wrap means (232) to be compressed, said first wrap means (242) so extends on said first end plate means (241) that its outer terminal end engages with the inner surface of said compressor housing, said second wrap means (232) extends over the same number of turns as said first wrap means (242), and said other part of the fluid is compressed by the orbital motion of said orbiting scroll member (23) whilst being guided along said second wrap means (232) into said another space.

2. A unit as claimed in Claim 1, wherein said second wrap means (232) are so formed that the portion thereof which extends from its outer terminal end to a position to be contacted with the outer terminal end of said first wrap means (242) has an outer contour which is an arcuate curve having a radius equal to the length from its spiral center to the outer edge of its outer terminal end.

3. A unit as claimed in Claim 1, wherein said first means (35) comprises a ring plate member (35) which has an outer diameter equal to the inner diameter of said housing and which is non-rotatably mounted in said housing in contact with a surface of said second end plate means (231) which is opposite to said second wrap means (232), and the inner diameter of said ring plate member (35) is smaller than the diameter of said second end plate means (231) by an amount sufficient to ensure contact between said ring plate member (35) and said second end plate means (231) during the orbital motion of said orbiting scroll member (23).

4. A unit as claimed in Claim 3, which further comprises a drive shaft (15) rotatably mounted on said housing, a drive pin (22) connected to said drive shaft (15) and being offset radially from the axis of said drive shaft to effect eccentric movement upon rotation of said drive shaft, said orbiting scroll member (23) being rotatably mounted on said drive pin (22), annular plate means (31) non-rotatably mounted in said housing and located on the side of said second end plate means (231) opposite to said second wrap means (232), an Oldham ring member (30) disposed between said annular plate means (31) and said second end plate means (231) and being connected by key and keyway connections (30a—d, 31a—b, 234a—b) to said annular plate means (31) and to said second end plate means (231), the Oldham ring member (30) being slidable in a first radial direction in relation to said annular plate means (31) and said second end plate means (231) being slidable in a second radial direction, perpendicular to said first radial direction, in relation to said Oldham ring member (30), said ring plate member (35) being disposed between said Oldham ring member (30) and said second end plate means (231), and said ring plate member (35) being provided with cut-away portions to permit the key and keyway connection (30a—b, 234a—b) between said Oldham ring member (30) and said second end plate means (231).

5. A unit as claimed in Claim 4, wherein said annular plate means (31) and said ring plate member (35') are formed integrally with one another.

6. A unit as claimed in Claim 1, wherein said housing includes a rear end plate (12), said rear end plate (12) is provided with a fluid suction chamber (122) connected to said fluid inlet port (124) and with a fluid discharge chamber (123) connected to said fluid outlet port (125), said suction chamber (123) communicating with said first chamber (131) through said second hole (244) of said first end plate means (241), and said discharge chamber (123) communicates with said first hole (243) of said first end plate means (241).

7. A unit as claimed in Claim 6, which further comprises oil separator means (36) which are disposed within said suction chamber (122) to prevent the fluid from directly flowing into said second hole (244), thereby to separate lubricating oil from the fluid, and an oil passageway (38, 39) connecting said first chamber (131) to a lower portion of said suction chamber (122) for returning the separated oil to said first chamber (131).

8. A unit as claimed in Claim 7, wherein said housing includes a front end plate (11), a drive shaft (15) is rotatably mounted in said front end plate (11) by first bearing means (14), said front end plate (11) having a shaft seal cavity (18) which surrounds said drive shaft (15), a shaft seal assembly (17) is mounted on said drive shaft (15) within said shaft seal cavity (18), a

drive pin (22) is connected to an inner end of said drive shaft (15) and is offset from the axis of said drive shaft so as to effect an eccentric movement upon rotation of said drive shaft, said orbiting scroll member (23) is rotatably mounted on said drive pin (22) by second bearing means (26), and said oil passageway (38, 39) includes a first portion (38) connecting the lower portion of said suction chamber (122) to said shaft seal cavity (18) and a second portion (39) connecting said shaft seal cavity (18) to an axially outer end surface of said drive pin (22), whereby oil in said suction chamber (122) flows into said shaft seal cavity (18) to lubricate said shaft seal assembly (17) and a part of the oil flows from the shaft seal cavity (18) into said first chamber (131) to lubricate said first bearing means (14), whilst another part flows from the shaft seal cavity (18) through said second portion (39) to the axially outer end of said drive pin (22) and returns therefrom into said first chamber (131) to lubricate said second bearing means (26).

9. A unit as claimed in Claim 8, wherein said orbiting scroll member (23) is provided with an axial boss (233) which is formed on a surface of said second end plate means (231) opposite to said second wrap means (232), said drive pin (22) is fitted into said boss (233) with said second bearing means (26) therebetween to rotatably support said orbiting scroll member (23), annular plate means (31) are non-rotatably mounted in said housing and are located on the side of said second end plate means (231) opposite to said second wrap means (232), an Oldham ring member (30) is disposed between said annular plate means (31) and said second end plate means (231) and is connected by key and keyway connections (30a—d, 31a—b, 234a—b) to said annular plate means (31) and to said second end plate means (231), said Oldham ring member (30) being slidable in a first radial direction in relation to said annular plate means (31) and said second end plate means (231) being slidable in a second radial direction, perpendicular to said first radial direction, in relation to said Oldham ring member (30), and said boss (233) being provided with at least one radial oil hole (40a—b) through which lubricating oil flows from the interior of said boss (233) to said Oldham ring (30) so that the key and keyway connections (30a—d, 31a—b, 234a—b) between said Oldham ring (30) and both said annular plate means (31) and said second end plate means (231) are lubricated.

Revendications

1. Dispositif compresseur du type à volute comportant un boîtier de compresseur ayant un raccord (124) d'admission du fluide et un raccord (125) de sortie du fluide, un élément de volute (24) fixe occupant une position stationnaire à l'intérieur dudit boîtier de compresseur et comportant une première plaque extrême (241) à laquelle des premiers moyens d'entourage (242) sont fixés, ladite première plaque extrême (241) étant percée d'un premier trou (243) dans une position adjacente au centre desdits premiers moyens d'entourage (242), ledit premier trou (243) étant relié audit raccord de sortie (125), une première chambre (131) délimitée par la face interne dudit boîtier de compresseur et ladite première plaque extrême (241) dudit élément de volute (24) fixe et logeant intérieurement lesdits premiers moyens d'entourage (242), et un élément de volute (23) à mouvement orbital disposé en orbite à l'intérieur de la première chambre (131) et présentant une seconde plaque extrême (231) à laquelle des seconds moyens d'entourage (232) sont fixés, lesdits premiers et seconds moyens d'entourage (242) et (232), respectivement, ajustés mutuellement, étant décalés angulairement d'un angle égal ou sensiblement égal à 180° et présentant plusieurs contacts linéaires de manière à délimiter au moins une poche à fluide isolée hermétiquement qui se déplace avec une réduction de volume lors du mouvement orbital dudit élément de volute (23) à mouvement orbital, de façon à comprimer le fluide dans la poche, le fluide comprimé étant déchargé par l'intermédiaire dudit premier trou (243) et dudit raccord de sortie (125), caractérisé par le fait qu'un second trou (244) est élaboré dans ladite première plaque extrême (241) à l'extérieur desdits premiers moyens d'entourage (242) et dans une position voisine d'une extrémité terminale externe desdits seconds moyens d'entourage (232), ledit second trou (244) est relié audit raccord (124) d'admission du fluide afin d'introduire du fluide dudit raccord d'admission dans ladite première chambre (131), un premier moyen (35) est prévu pour fermer un intervalle entre l'extrémité périphérique externe de ladite seconde plaque extrême (231) et la face interne dudit boîtier du compresseur, tout en permettant le mouvement orbital dudit élément de volute (23) à mouvement orbital, le fluide introduit par l'intermédiaire dudit second trou (244) étant confiné entre les première et seconde plaques extrêmes (241) et (231), respectivement, une partie du fluide étant admise dans un premier espace entre ladite région extrême externe terminale desdits seconds moyens d'entourage (232) et les premiers moyens d'entourage adjacents (242) en vue d'être comprimée et l'autre partie de ce fluide étant guidée le long desdits seconds moyens d'entrouage (232) en pénétrant dans un autre espace entre la région extrême externe terminale desdits premiers moyens d'entourage (242) et les seconds moyens d'entourage adjacents (232) en vue d'être comprimée, ledit premier moyen d'entourage (242) s'étendant, sur ladite première plaque extrême (241), de telle sorte que son extrémité externe terminale vienne au

contact de la face interne dudit boîtier de compresseur, ledit second moyen d'entourage (232) s'étend sur le même nombre de spires que ledit premier moyen d'entourage (242), et ladite autre partie du fluide est comprimée par le mouvement orbital dudit élément de volute (23) à mouvement orbital tout en étant guidée le long desdits seconds moyens d'entourage (232) pour pénétrer dans ledit autre espace.

2. Dispositif selon la revendication 1, dans lequel lesdits seconds moyens d'entourage (232) sont réalisés de telle sorte que la partie de ces derniers qui s'étend au-delà de son extrémité terminale externe vers un endroit où elle entre en contact avec l'extrémité terminale externe desdits premiers moyens d'entourage (242) ait une configuration externe qui est une ligne courbe ayant un rayon égal à la longueur depuis le centre de sa spirale jusqu'au bord externe de son extrémité terminale externe.

3. Dispositif selon la revendication 1, dans lequel ledit premier moyen (35) consiste en un disque annulaire (35) qui possède un diamètre externe égal au diamètre interne dudit boîtier et qui est monté sans pouvoir tourner dans ledit boîtier, en contact avec une surface de ladite seconde plaque extrême (231) qui est opposée auxdits seconds moyens d'entourage (232), et le diamètre interne dudit disque annulaire (35) est plus petit, que le diamètre de ladite seconde plaque extrême (231), d'une valeur suffisante pour assurer un contact entre ledit disque annulaire (35) et ladite seconde plaque extrême (231) lors du mouvement orbital dudit élément de volute (23) à mouvement orbital.

4. Dispositif selon la revendication 3, qui comprend en outre un arbre d'entraînement (15) monté à rotation sur ledit boîtier, un tourillon d'entraînement (22) relié audit arbre d'entraînement (15) et étant décalé radialement de l'axe dudit arbre d'entraînement pour produire un mouvement excentré lors de la rotation dudit arbre d'entraînement, ledit élément de volute (23) à mouvement orbital étant monté rotatif sur ledit tourillon d'entraînement (22), un disque annulaire (31) monté non rotatif sur ledit boîtier et situé sur le côté de ladite seconde plaque extrême (231) opposé auxdits seconds moyens d'entourage (232), une bague (30) du type Oldham intercalée entre ledit disque annulaire (31) et ladite seconde plaque extrême (231) et étant reliée par des liaisons par clavettes et logements de clavettes (30a—d, 31a—b, 234a—b) audit disque annulaire (31) et à ladite seconde plaque extrême (231), cette bague (30) du type Oldham pouvant coulisser dans une première direction radiale par rapport audit disque annulaire (31) et ladite seconde plaque extrême (231) pouvant coulisser dans une seconde direction radiale, perpendiculairement à ladite première direction radiale, par rapport à ladite bague (30) du type Oldham, ledit disque annulaire (35) étant intercalé entre ladite bague (30) du type Oldham et ladite seconde plaque extrême (231), et ledit disque annulaire (35) étant muni de zones évidées pour permettre la liaison par clavette et par logement de clavette (30a—b, 234a—b) entre ladite bague (30) du type Oldham et ladite seconde plaque extrême (231).

5. Dispositif selon la revendication 4, dans lequel ledit disque annulaire (31) et ladite zone discoïdale (35') forment l'un avec l'autre un seul tenant.

6. Dispositif selon la revendication 1, dans lequel ledit boîtier comporte un disque extrême postérieur (12), ledit disque extrême postérieur (12) étant doté d'une chambre (122) d'aspiration de fluide reliée audit raccord (124) d'admission du fluide et d'une chambre (123) de détente du fluide reliée audit raccord (125) de sortie du fluide, ladite chambre d'aspiration (123) communiquant avec ladite première chambre (131) par l'intermédiaire dudit second trou (244) de ladite première plaque extrême (241), et ladite chambre de détente (123) communique avec ledit premier trou (243) de ladite première plaque extrême (241).

7. Dispositif selon la revendication 6, qui comprend en outre des moyens séparateurs d'huile (36) qui sont placés à l'intérieur de ladite chambre d'aspiration (122) pour empêcher le fluide de s'écouler directement dans ledit second trou (244), de manière à séparer l'huile lubrifiante du fluide, et un canal d'huile (38, 39) raccordant ladite première chambre (131) à une région inférieure de ladite chambre d'aspiration (122) pour faire retourner l'huile séparée à ladite première chambre (131).

8. Dispositif selon la revendication 7, dans lequel ledit boîtier comporte un disque extrême antérieur (11), un arbre d'entraînement (15) est monté rotatif dans ledit disque extrême antérieur (11) par un premier moyen de portée (14), ledit disque extrême antérieur (11) comportant une cavité (18) d'étanchement de l'arbre qui entoure ledit arbre d'entraînement (15), un dispositif (17) d'étanchement de l'arbre est monté sur ledit arbre d'entraînement (15) à l'intérieur de ladite cavité (18) d'étanchement de l'arbre, un tourillon d'entraînement (22) est relié à une extrémité interne dudit arbre d'entraînement (15) et est décalé de l'axe dudit arbre d'entraînement de façon à assurer un mouvement excentré lors de la rotation dudit arbre d'entraînement, ledit élément de volute (23) à mouvement orbital est monté à rotation sur ledit tourillon d'entraînement (22) par un deuxième moyen de portée (26), et ledit canal d'huile (38, 39) comprend une première partie (38) reliant la région inférieure de ladite chambre d'aspiration (122) à ladite cavité (18) d'étanchement de l'arbre et une seconde partie (39) reliant ladite cavité (18) d'étanchement de l'arbre à une surface extrême axialement externe dudit tourillon d'entraînement (22), ce qui fait que l'huile dans ladite chambre d'aspiration (122) s'écoule dans ladite cavité (18) d'étanchement de l'arbre pour lubrifier ledit dis-

positif (17) d'étanchement de l'arbre et une partie de l'huile s'écoule de la cavité (18) d'étanchement de l'arbre dans ladite première chambre (131) pour lubrifier le premier moyen de portée (14), cependant qu'une autre partie s'écoule de la cavité (18) d'étanchement de l'arbre, en parcourant ladite seconde partie (39), vers l'extrémité axialement externe dudit tourillon d'entraînement (22) et retourne de là à ladite première chambre (131) pour lubrifier ledit deuxième moyen de portée (26).

9. Dispositif selon la revendication 8, dans lequel ledit élément de volute (23) à mouvement orbital est pourvu d'un bosselage axial (233) qui est formé sur une surface de ladite seconde plaque extrême (231) opposée auxdits seconds moyens d'entourage (232), ledit tourillon d'entraînement (22) est ajusté dans ledit bosselage (233) avec ledit deuxième moyen de portée (26) intercalé entre eux, de manière à supporter en rotation ledit élément de volute (23) à mouvement orbital, des disques annulaires (31) sont montés non rotatifs dans ledit boîtier et sont situés du côté de ladite seconde plaque extrême (231) opposé auxdits seconds moyens d'entourage (232), une bague (30) du type Oldham est intercalée entre ledit disque annulaire (31) et ladite seconde plaque extrême (231) et est reliée audit disque annulaire (31) et à ladite seconde plaque extrême (231) par des liaisons par clavettes et logements de clavettes (30a—d, 31a—b, 234a—b), ladite bague (30) du type Oldham pouvant coulisser dans une première direction radiale par rapport audit disque annulaire (31) et ladite seconde plaque extrême (231) pouvant coulisser dans une seconde direction radiale, perpendiculairement à ladite première direction radiale, par rapport à ladite bague (30) du type Oldham, et ledit bosselage (233) étant muni d'au moins un canal radial (40a—b) parcouru par de l'huile, par l'intermédiaire duquel de l'huile lubrifiante s'écoule de l'intérieur dudit bosselage (233) à ladite bague (30) du type Oldham, de telle façon que les liaisons par clavettes et logements de clavettes (30a—d, 31a—b, 234a—b) entre ladite bague (30) du type Oldham et à la fois ledit disque annulaire (31) et ladite seconde plaque extrême (231) soient lubrifiées.

Patentansprüche

1. Kompressor in Schneckenbauart, bestehend aus einem Kompressorgehäuse mit einem Strömungsmitteleinlaß (124) und einem Strömungsmittelauslaß (125), einem im Kompressorgehäuse fest angeordneten stationären Schneckenkörper (24), der von einer ersten Stirnplatte (241) mit darauf befestigter erste Spiralwand (242) gebildet wird, wobei in der ersten Stirnplatte an einer neben der Mitte der ersten Spiralwand (242) liegenden Stelle eine erste mit dem Strömungsmittelauslaß (125) verbundene Öffnung (243) vorgesehen ist, einer zwischen Innenwand des Kompressorgehäuses und der ersten Stirnplatte (241) des stationären Schneckenkörpers (24) liegenden, die erste Spiralwand (242) aufnehmenden ersten Kammer (131) und einem in der ersten Kammer (131) kreisend bewegbar gelagerten, umlaufenden Schneckenkörper (23), der von einer zweiten Stirnplatte (231) mit darauf befestigter zweiter Spiralwand (232) gebildet wird, wobei die erste und die zweite Spiralwand (242, 232) um einen Winkel von etwa 180° versetzt ineinandergreifen und sich entlang einer Mehrzahl von Linien berühren, so daß mindestens eine geschlossene Strömungsmitteltasche entsteht, welche bei der kreisenden Bewegung des umlaufenden Schneckenkörpers (23) einer Volumenreduktion unterliegt, so daß das Strömungsmittel in der Tasche komprimiert und über die erste Öffnung (243) zum Strömungsmittelauslaß (125) abgegeben wird, dadurch gekennzeichnet, daß neben dem Außenrand der zweiten Spiralwand (232) in der ersten Stirnplatte (241) außerhalb der ersten Spiralwand (242) eine zweite mit dem Strömungsmitteleinlaß (124) verbundene Öffnung (244) vorgesehen ist, über die das vom Einlaß kommende Strömungsmittel zur ersten Kammer (131) strömt, daß im Spalt zwischen Außenrand der zweiten Stirnplatte (231) und Innenwand des Kompressorgehäuses eine erste, die Umlaufbewegung des kreisend bewegbaren Schneckenkörpers (23) nicht behindernde Strömungsmittelsperre (35) vorgesehen ist, so daß von dem über die zweite Öffnung (244) in den Raum zwischen erster und zweiter Stirnplatte (241, 231) eintretenden Strömungsmittel ein Teil in einem ersten Raum zwischen dem Außenrand der zweiten Spiralwand (232) und der benachbarten ersten Spiralwand (242) zur Komprimierung gelangt und ein anderer Strömungsmittelteil entlang der zweiten Spiralwand (232) fließt und in einem anderen Raum zwischen dem Außenrand der ersten Spiralwand (242) und der benachbarten zweiten Spiralwand (232) durch die Bewegung des kreisend bewegten Schneckenkörpers (23) zur Kompression gelangt, wobei die erste Spiralwand (242) auf der ersten Stirnplatte (241) so verläuft, daß ihr Außenrand die Innenwand des Kompressorgehäuses beaufschlagt und die zweite Spiralwand (232) sich über die gleiche Anzahl von Windungen erstreckt, wie die erste Spiralwand (242).

2. Kompressor nach Anspruch 1, dadurch gekennzeichnet, daß die zweite Spiralwand (232) so geformt ist, daß ihr Abschnitt zwischen dem Außenende und der vom Außenende der ersten Spiralwand (242) zu beaufschlagenden Stelle entsprechend einer Kreisbogenlinie verläuft, deren Radius mit dem Abstand zwischen Spiralmittelpunkt und Außenrand des Außenendes übereinstimmt.

3. Kompressor nach Anspruch 1, dadurch gekennzeichnet, daß die erste Strömungsmittelsperre ein undrehbar im Gehäuse

gelagerter und die zweite Stirnplatte (231) an der vom zweiten Schneckenkörper (232) abgelegenen Seite beaufschlagender Ringkörper (35) ist, dessen Außenmesser mit dem Innendurchmesser des Gehäuses übereinstimmt und dessen Innendurchmesser kleiner ist als der Durchmesser der zweiten Stirnplatte (231), wobei die Ringbreite ausreichend groß ist, um bei der kreisenden Bewegung des umlaufenden Schneckenkörpers (23) einen Kontakt zwischen Ringkörper (35) und zweiter Stirnplatte (231) sicher zu stellen.

4. Kompressor nach Anspruch 3, dadurch gekennzeichnet, daß im Kompressorgehäuse eine Antriebswelle (15) mit radial versetztem, exzentrisch umlaufenden Antriebszapfen (22) gelagert ist, daß der umlaufende Schneckenkörper (23) drehbar auf dem Antriebszapfen (22) gelagert ist, daß im Gehäuse an der vom zweiten Schneckenkörper (32) abgelegenen Seite neben der zweiten Stirnplatte (231) eine Ringplatte (31) drehfest gelagert ist, daß zwischen der Ringplatte (31) und der zweiten Stirnplatte (231) eine Kreuzscheibenkupplung mit einem Oldham-Ring (30) vorgesehen ist, die über Führungsnuten und Führungsstege (30a—30d, 31a—31b, 234a—234b) mit der Ringplatte (31) und der zweiten Stirnplatte (231) in Verbindung steht, daß der Oldham-Ring (30) gegenüber der Ringplatte (31) in einer ersten radialen Richtung und die zweite Stirnplatte (231) gegenüber dem Oldham-Ring (30) in einer zweiten, senkrecht zur ersten verlaufenden radialen Richtung verschiebbar ist, und daß der Ringkörper (35) zwischen Oldham-Ring (30) und zweiter Stirnplatte (231) liegt und mit Ausnehmungen versehen ist, um die Kupplungsverbindung (30a—30b, 234a—234b) zwischen Oldham-Ring (30) und zweiter Stirnplatte (231) zu ermöglichen.

5. Kompressor nach Anspruch 4, dadurch gekennzeichnet, daß die Ringplatte und der Ringkörper (35') als gemeinsamer Bauteil ausgebildet sind.

6. Kompressor nach Anspruch 1, dadurch gekennzeichnet, daß eine im hinteren Gehäuseteil (12) angeordnete Saugkammer (122) mit dem Strömungsmitteleinlaß (124) und eine Auslaßkammer (123) mit dem Strömungsmittelauslaß (125) verbunden sind, daß die Saugkammer (123) über die zweite Öffnung (244) der ersten Stirnplatte (241) mit der ersten Kammer (131) in Verbindung steht und daß die Auslaßkammer (123) eine Verbindung zur ersten Öffnung (243) der ersten Stirnplatte (241) hat.

7. Kompressor nach Anspruch 6, dadurch gekennzeichnet, daß in der Saugkammer (122) ein Ölabweiser (36) angeordnet ist, der einen direkten Zugang des Strömungsmittels zur zweiten Öffnung (244) verhindert und das Schmieröl abtrennt und daß zwischen der ersten Kammer (131) und einem tiefergelegenem Teil der Saugkammer (122) ein Schmierölkanal (38, 39) vorgesehen ist, der das abgeschiedene Schmieröl zur ersten Kammer (131) zurückleitet.

8. Kompressor nach Anspruch 7, dadurch gekennzeichnet, daß die Antriebswelle (15) im vorderen Gehäuseteil (11) in einem ersten Lager (14) drehbar gelagert ist, daß der vordere Gehäuseteil (11) eine die Antriebswelle (15) umgebende Ausnehmung (18) für eine Wellendichtung (17) aufweist, daß das innere Ende der Antriebswelle (15) einen gegenüber der Achse der Antriebswelle versetzten, exzentrisch umlaufenden Antriebszapfen (22) trägt, auf dem mit einem zweiten Lager (26) der umlaufende Schneckenkörper (23) gelagert ist, daß der Ölkanal (38, 39) aus zwei Teilen besteht, nämlich einem ersten Teil (38), der den tiefergelegenen Teil der Saugkammer (122) mit der Ausnehmung (18) verbindet und einem zweiten Teil (39), der die Ausnehmung (18) mit der außenliegenden Stirnfläche des Antriebszapfens (22) verbindet, so daß das Schmieröl von der Saugkammer (122) in die Ausnehmung (18) gelangt, um die Wellendichtung (17) zu schmieren, wobei dann ein Teil des Schmieröls von der Ausnehmung (18) in die erste Kammer (131) gelangt, um das erste Lager (14) zu schmieren, während ein weiterer Teil des Schmieröls von der Ausnehmung (18) über den zweiten Ölkanalteil zur äußeren Stirnfläche des Antriebszapfens (22) gelangt, um dann wieder in die erste Kammer (131) einzutreten und das zweite Lager (26) zu schmieren.

9. Kompressor nach Anspruch 8, dadurch gekennzeichnet, daß der umlaufende Schneckenkörper (23) auf der zweiten Stirnplatte (231) auf der von der zweiten Spiralwand (232) abgelegenen Seite eine axiale Nabe (233) trägt, daß der Antriebszapfen (22) mit dem zweiten Lager (26) in die Nabe (233) eingreift, um den umlaufenden Schneckenkörper (23) zu bewegen, daß neben der zweiten Stirnplatte (231) an der von der zweiten Spiralwand (232) ablegenen Seite im Gehäuse eine Ringplatte (31) drehfest angeordnet ist, daß zwischen der Ringplatte (31) und der zweiten Stirnplatte (231) ein Oldham-Ring (30) angeordnet ist, der über Führungsnuten und Führungsstege (30a—30d, 31a—31b, 234a—234b) mit der Ringplatte (31) und der zweiten Stirnplatte (231) verbunden ist, daß der Oldham-Ring (30) in einer ersten Radialrichtung gegenüber der Ringplatte (31) verschiebbar ist, daß die zweite Stirnplatte (231) gegenüber dem Oldham-Ring (30) in einer zweiten senkrecht zur ersten verlaufenden radialen Richtung verschiebbar ist und daß die Nabe (233) mit mindestens einer radialen Schmierölbohrung (40a—40b) versehen ist, über die das Schmieröl vom Inneren der Nabe (233) zum Oldham-Ring (30) fließen kann, um die Führungs-Verbindungen (30a—30d, 31a—31b, 234a—234b) zwischen Oldham-Ring (30) und einerseits der Ringplatte (31) und andererseits der zweiten Stirnplatte (231) zu schmieren.

FIG 1a

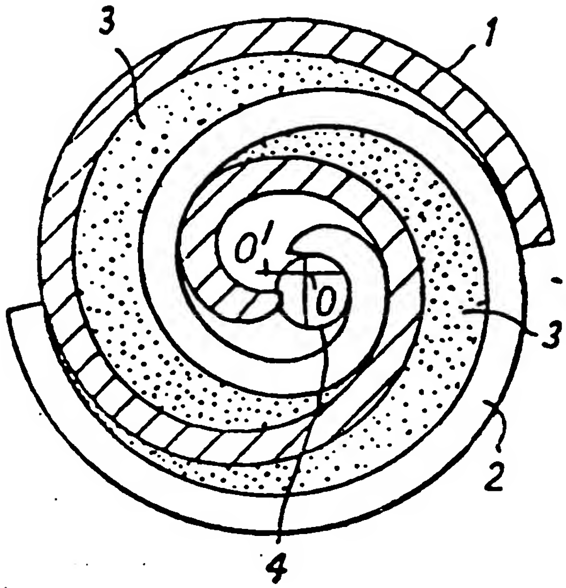

FIG. 1b

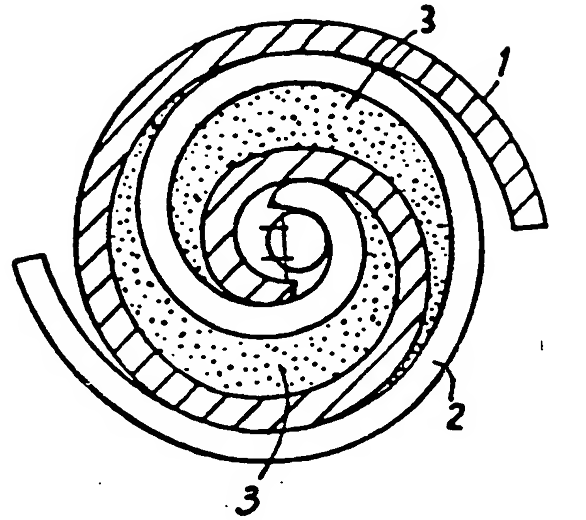

FIG. 1c

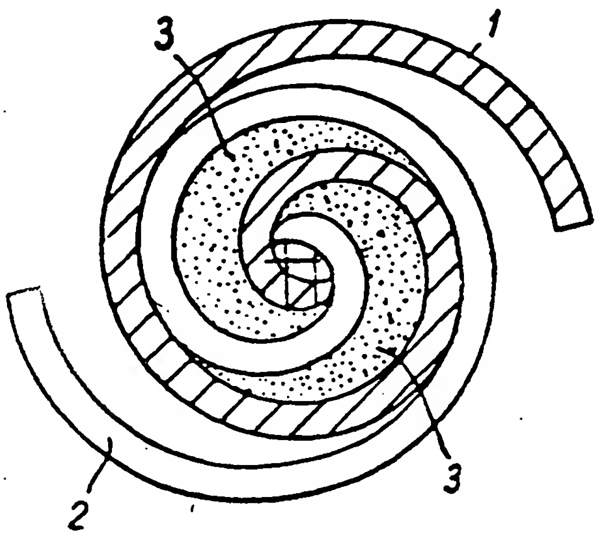

FIG. 1d

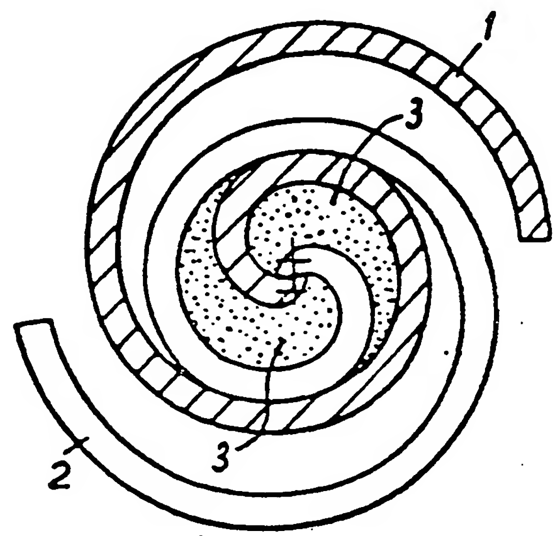

FIG. 2

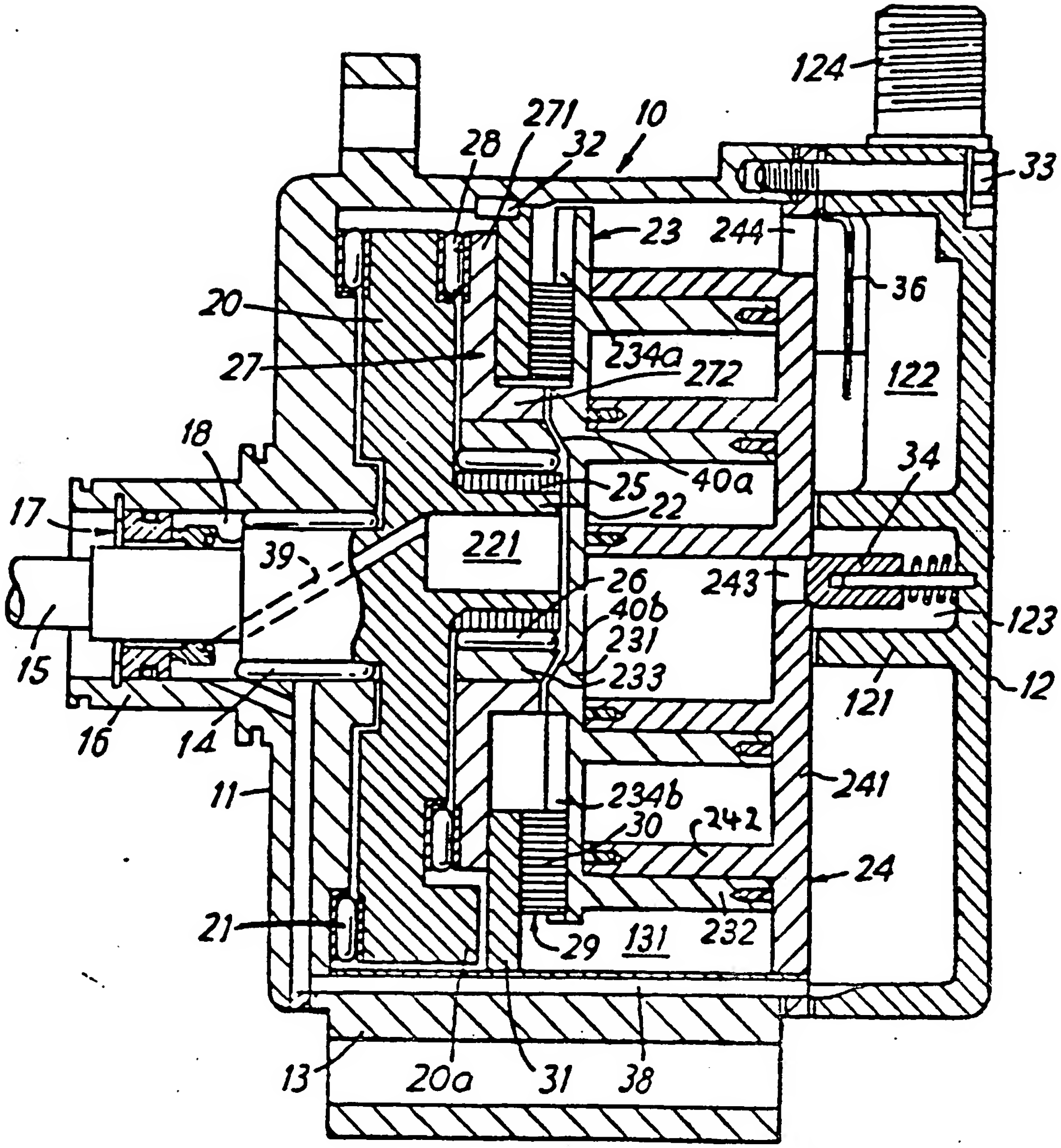

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FIG. 3

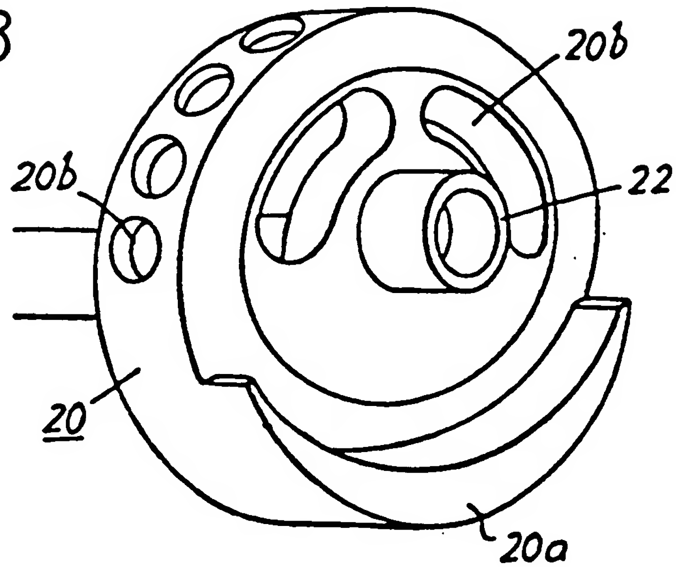


FIG. 4

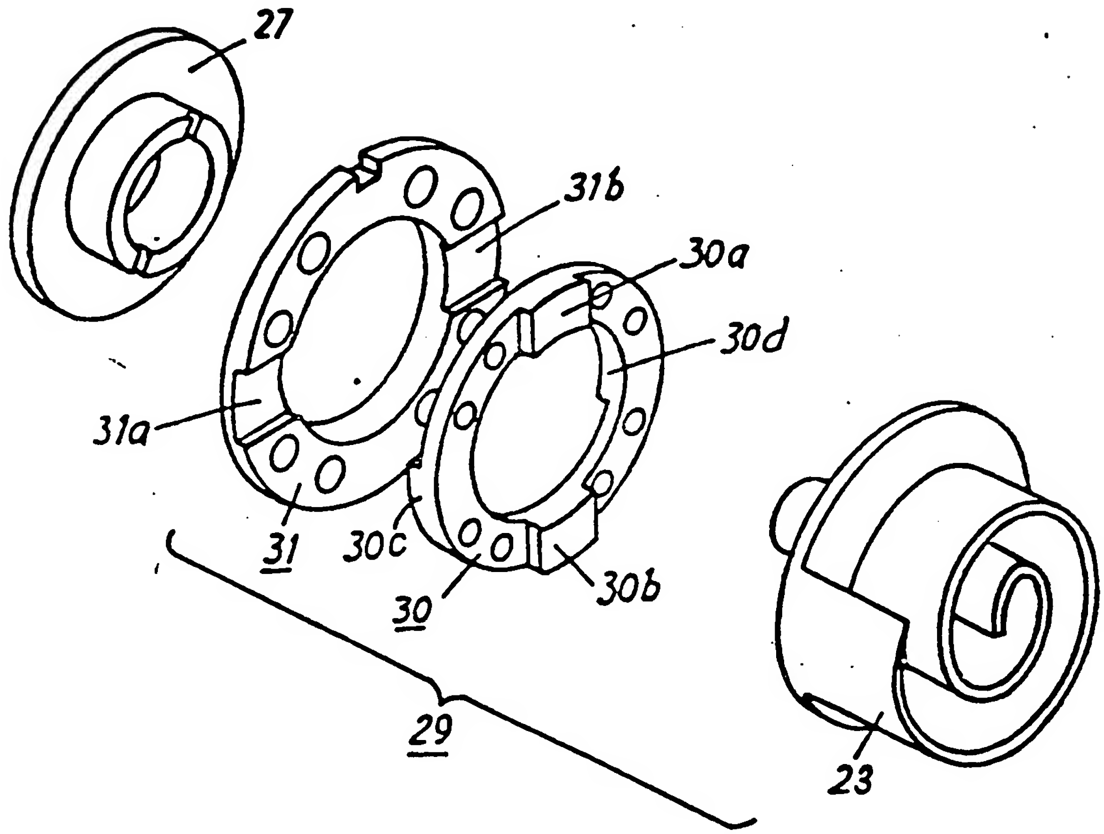


FIG.5

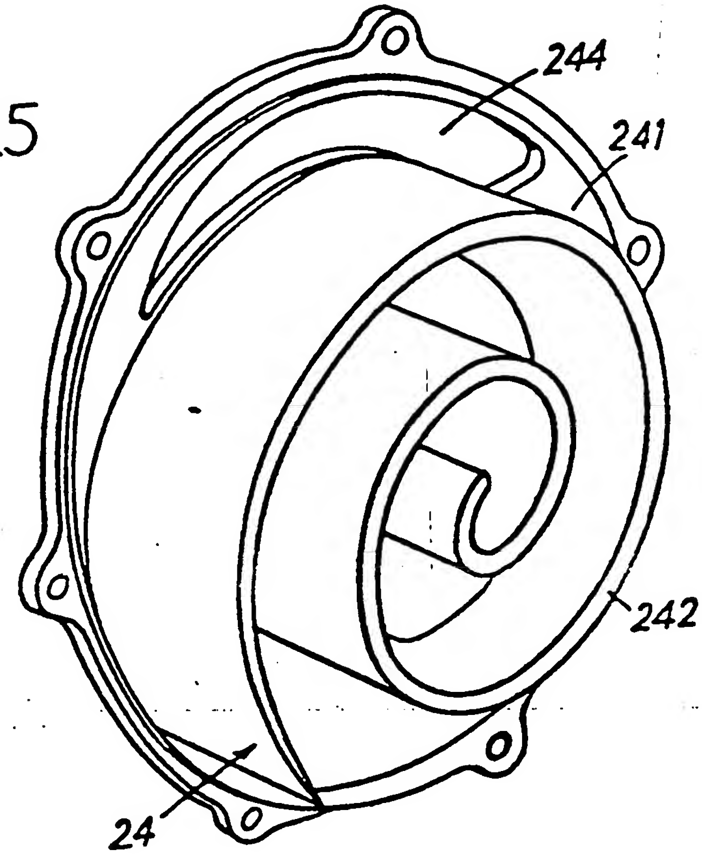


FIG.9

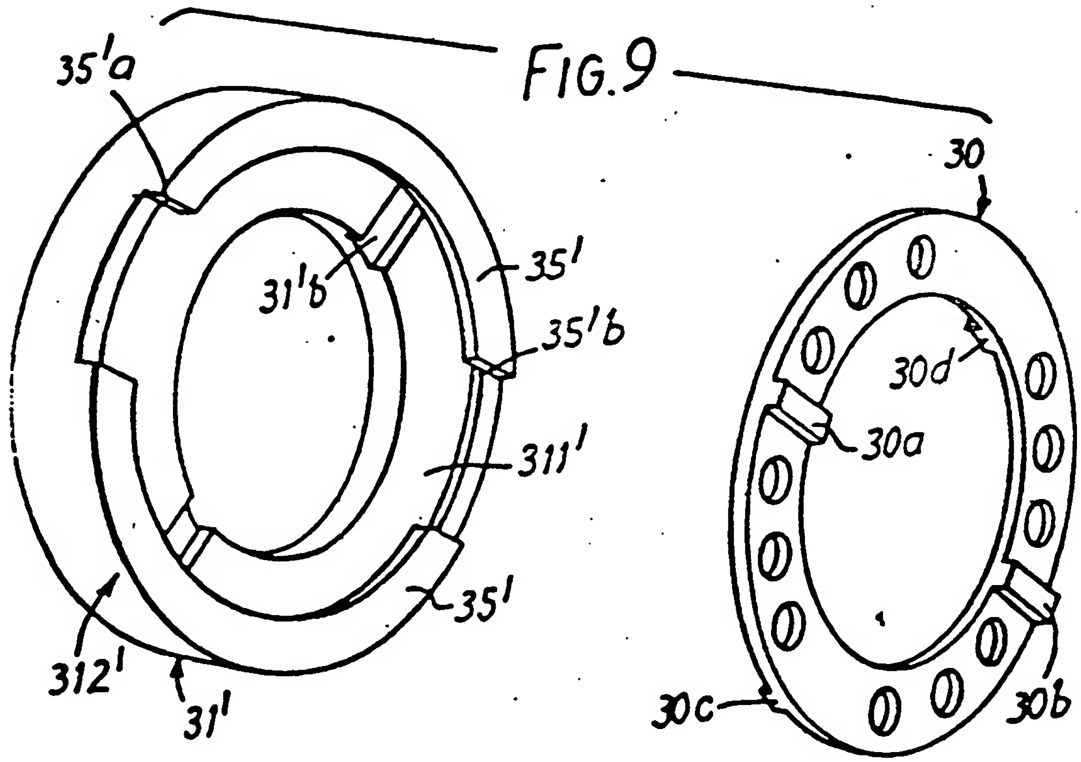


FIG.6

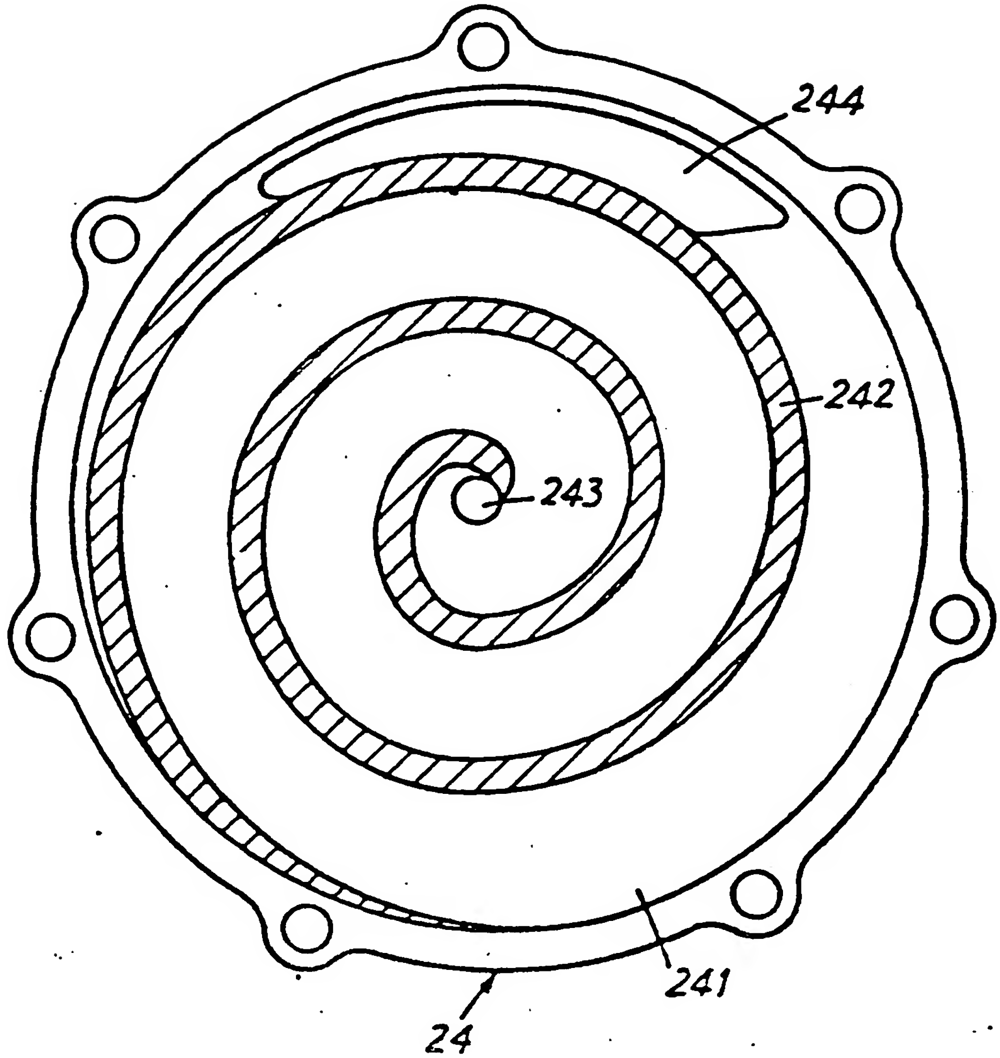


FIG. 7a

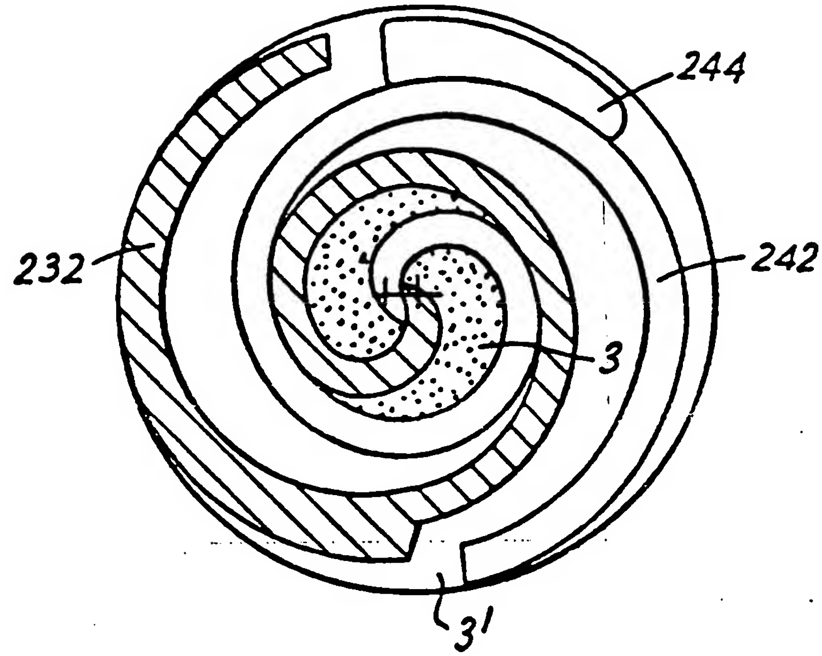


FIG. 7b

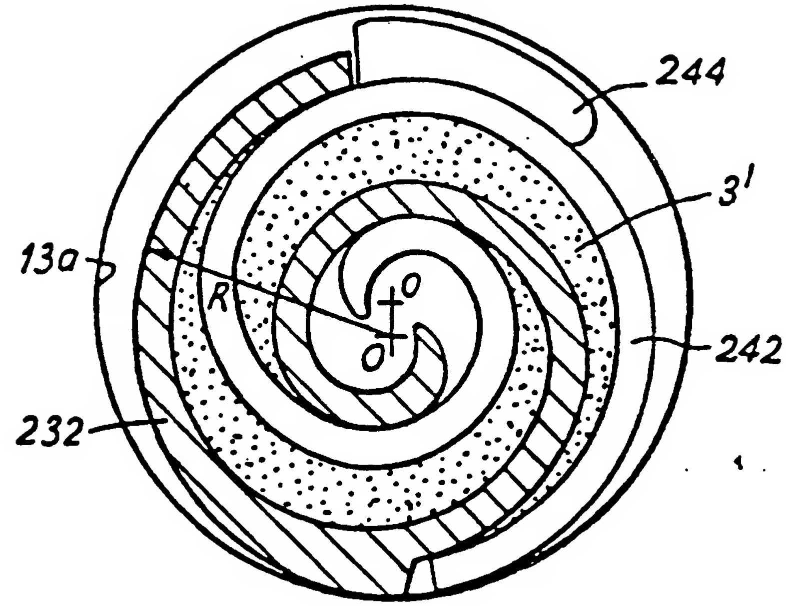


FIG.7c

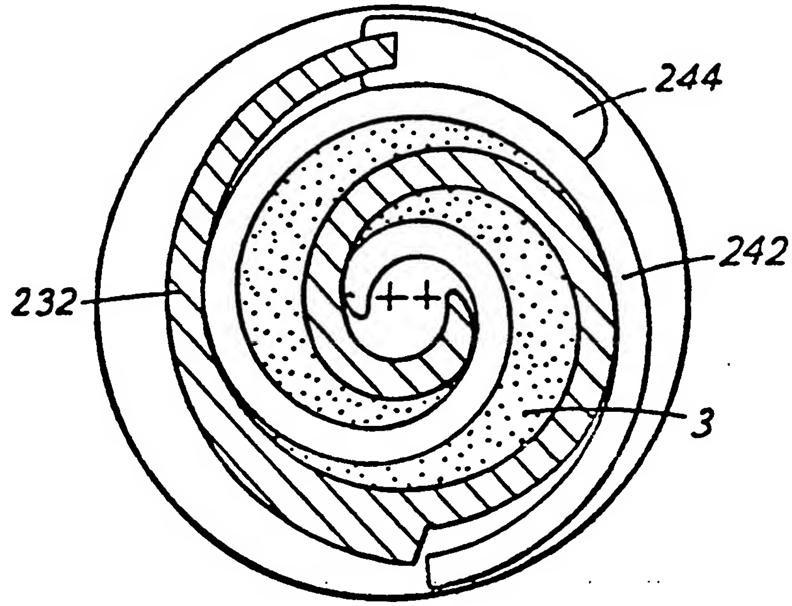


FIG.7d

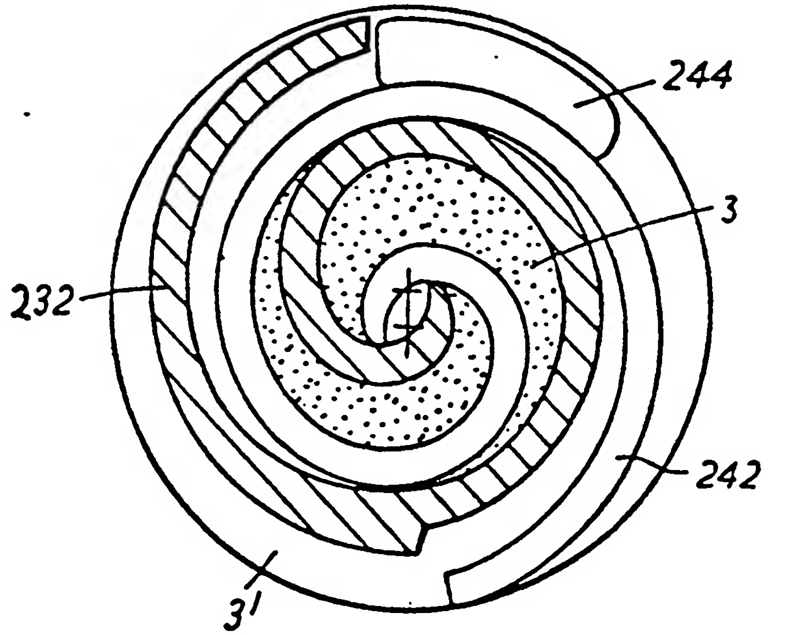
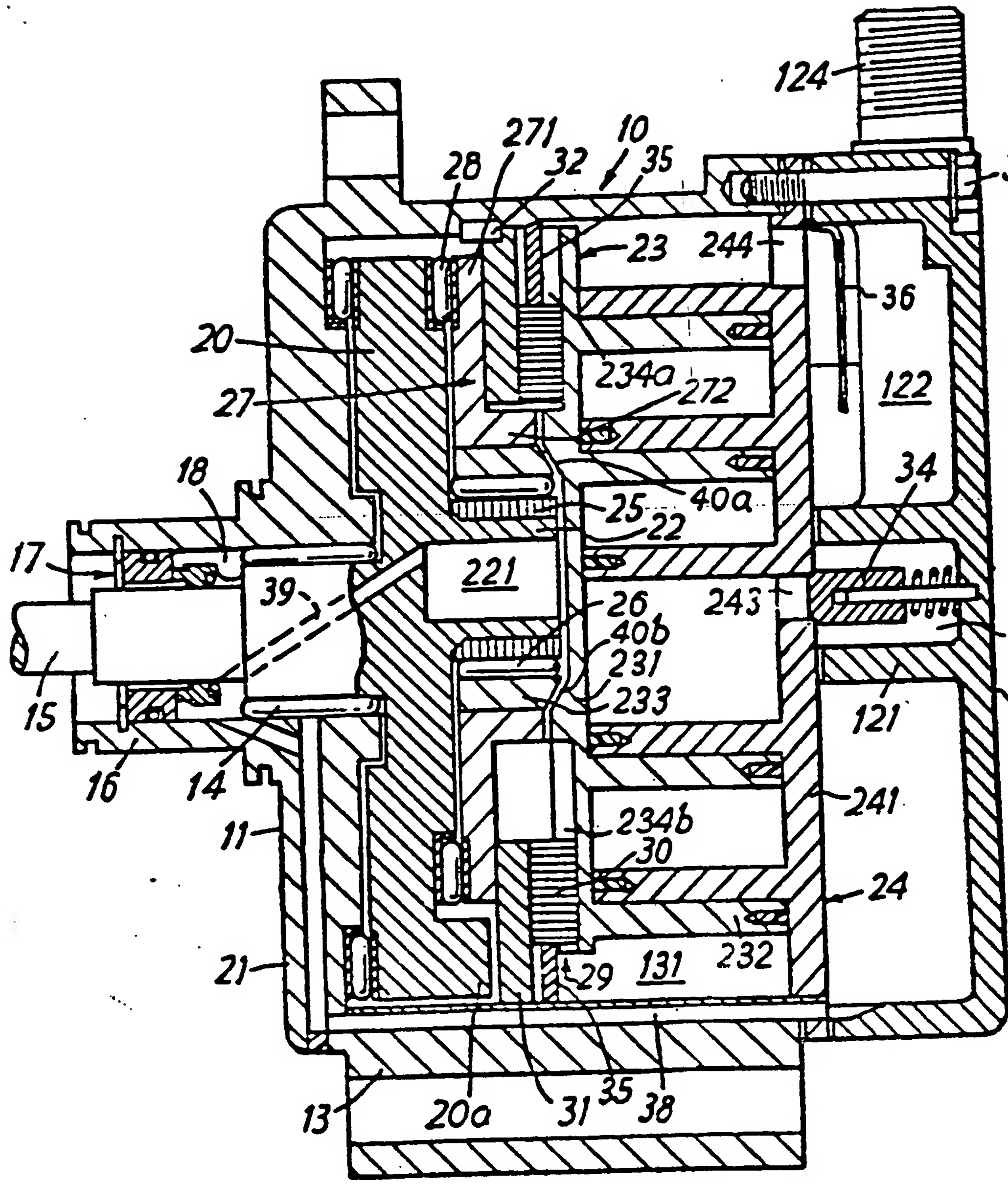


FIG.8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